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Prevalence of Mechanical Back Pain, Lumbar Lordosis and Disability Among Prolonged Standing Vs Prolonged Sitting Workers - Observational Study

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ABSTRACT

Background of the study: Low back pain is a common medical condition usually self-limiting lasting less than 3 months. It is an emerging problem in the adolescents with an incidence that is highest in the 3rd decade of life worldwide.60%-80% of adults experience low back pain in some point of their lifetime. When low back pain is untreated it leads to chronic low back pain which is the leading cause of disability.
Objective: To identify the prevalence of low back pain in working professionals who predominantly use sitting posture and standing postures.
Materials & Method: 30 individuals with low back pain were randomly assigned into standing and sitting group. The outcomes were measures of Pain, Lumbar lordosis, Disability mesured using Numerical pain rating scale, Flexible ruler, Quebec back pain disability scale.
Study design: Observational Study-Cross sectional study.
Study setting: Physical Medical and Rehabilitation, Orthopaedics Department, PSG Hospitals, Coimbatore.
Participant: Study sample will consist of patient from PSG Hospitals.
Study duration: 10 months.
Result: 30 low back pain, individuals with each 15 individuals in standing group and 15 individuals in sitting group were recruited for this study. The analysis done between both the groups for pain, disability and lumbar lordosis.
Conclusion: This study was conducted to find out the prevalence of mechanical back pain, disability and lumbar lordosis in prolonged sitting and standing posture in working with the age group of 25-50years. The overall interpretation of the study states that back pain is prevalent in working professional who have standing occupation.

Keywords: *Mechanical low back pain, Lumbar lordosis, Flexible ruler, Disability,*

INTRODUCTION

Low back pain is characterised as "pain and discomfort, localised below the costal margin and the inferior gluteal folds, with or without leg pain" and can be divided into three types: acute, subacute, and chronic [(1)]. Low back pain is classified as acute when an incident lasts less than six weeks, subacute when it lasts between six and twelve weeks, and chronic when it lasts for 12 weeks or more [(1)].

In recent years, low back pain has been among the most often reported musculoskeletal disorders. It is possible to experience low back discomfort in the lumbar, lumbosacral, or sacroiliac regions.

Low back pain mostly causes mechanical discomfort and impairment [(1)].

Standing and sitting jobs demand workers to maintain a static posture for extended periods of time, which can cause lower back pain [(1)]. Two of the most frequent postures adopted while performing various jobs are sitting and standing. Computer professionals, bankers, receptionists, chartered accountants, and desktop jobs are among the occupations that need prolonged sitting. Security guards, professors, beauticians and chemists are among the professions that call for standing. These jobs entail spending a lot of time in one position[1]. Low back pain might result from long work hours with insufficient breaks. The discomfort felt when standing may be brought on by several factors, including maintaining an upright position, which can induce muscle exhaustion, strains imposed on the disc as a result of excessive lordosis, and co-activation of the agonist and antagonist muscles of the back [(1)].

The tension on the spine, where the disc must bear significant compressive force and there is an increase in intradiscal pressure, may be the main source of the pain experienced when sitting. This progressive tissue deterioration may result [(1)].

The function and tone of the pelvic/back ligaments, back muscles, and abdominal muscles appear to be related to changes in lumbar lordosis. These muscles' weakness may result in lumbar lordosis and a forward tilt [(2)]. Extensors and flexors of the spine cooperate to keep the pelvis tilted and the trunk upright while standing. When standing with an upright posture, an anterior pelvic tilt causes the lumbar spine's lordosis curve to increase. Equal weight bearing on both limbs is necessary, however people may shift their weight to one side when standing for an extended period of time and develop poor posture [(1)].

Due to the posterior pelvic tilt that occurs while sitting, the lumbar curve is reduced. To keep an upright posture and avoid slouching, the upper and lower erector spin must contract vigorously [(1)].

It can be divided into 2 categories Mechanical low back pain and Neurogenic low back pain Mechanical low back pain refers to inflammation of the facet joint and disc, Ligaments or muscles of the low back pain cause mechanical low back pain. This is a result of strain, overuse and trauma [(3)]. Neurogenic low back pain is caused by irritation or pinching of nerve root. A disc or bony spur compress the nerve root.

Incidence:

With a prevalence that peaks in the third decade of life globally, it is a rising issue among adolescents. At some point in their lives, 60–80% of adults will have low back discomfort [(4)].

In India, 4.6% of people had disability-adjusted life years from musculoskeletal disorders, while close to 8% of people lived with a handicap brought on by low back pain. Between 1990 and 2016, there was a 1.2% to 2.3% shift in the disability-adjusted life years in relation to low back pain [(5)].

So, the purpose of the study is to identify the prevalence of low back pain in working professional who predominantly use sitting posture and standing posture.

MATERIALS & METHODS

The subjects from orthopaedics, physical medical and rehabilitation department referred by orthopaedic consultant and physician with mechanical low back pain were screened by physiotherapist. The included subjects were of age group 25 – 50 years, acute mechanical low back pain patients due to occupation, prolonged standing and prolonged sitting workers – duration >4-5hours, working experience >1year in same field. The subjects were excluded if there is history of neurological and cardiovascular disorders, osteoporosis, pregnant ladies, obese patients body mass index >25, recent surgery in spine, lower limb, and abdominal surgery.

30 subjects diagnosed as mechanical low back pain were included in our study and they were screened according to our inclusion and exclusion criteria. The

informed consent was obtained from eligible participants. Demographic information, complete occupational history, functional disability, pain, lumbar lordosis with previous medical intervention were recorded (Table-1). The initial assessment done along with the special test (Straight leg raising test and Lumbar quadrant test). They were assessed for disability using Quebec back pain disability scale and Numerical pain rating scale (NPRS) for severity of pain. Lumbar lordosis was assessed using flexible ruler.

Each subject was asked to mark NPRS with average pain intensity for their pain. The subjects were asked to fill the Quebec Back Pain Disability Scale. It is composed of 20 questions and 6 domains, reflecting the spheres of everyday activities sleep/rest, sitting/rising, walking, moving, bending/ squatting, and lifting heavy objects. The responses are marked on a scale of 0 to 6 where, 0 corresponds to no limitations, whereas 5 signifies maximum restrictions to everyday functional status. The overall result varies between 0 (no worsening of spine function) to 100 (maximum restrictions on functional status).

The lumbar lordosis of the subjects was measured by using flexible ruler. We set flexible ruler on lumbar region until it shaped lumbar lordosis curvature. After the ruler was fixed on lumbar region, the points in contact with the middle parts of dots were marked by a color pen. Without a change in the shape, the ruler was carefully placed on a white paper, where the shape of the ruler could be reproduced and spots corresponding to T12 and S2 could be marked. For lumbar lordosis angle calculation, we connected the T12 spot to the S2 spot by a straight line and drew a line perpendicular to its center passing the curve. These lines were named L and H respectively. Lumbar lordosis can be calculated by replacing the lengths of these lines in the following equation:

$$\theta = 4\text{Arc tan } 2H / L$$

The study obtained ethical clearance from Institutional Review board.

STATISTICAL ANALYSIS

All statistical analysis was done using SPSS 17 windows software. All these data were analyzed using descriptive statistics, independent "t" test. The statistical significance was set as P <0.5. Descriptive statistics was used to calculate mean and standard deviation. Analysis done using independent "T" test to show significant difference between the group among pain, disability and lumbar lordosis.

RESULT

30 low back pain, individuals with each 15 individuals in standing group and 15 individuals in sitting group were recruited for this study. The analysis done between both the groups for pain, disability and lumbar lordosis.

Statistical analysis done using independent "t" test for pain between both groups obtained (t value= 2.15, p value< 0.05). The result shows significant difference between sitting and standing group individuals (Table-2).

Analysis done using independent "t" test for disability between both groups obtained (t value= 9.86, p value> 0.05). The result shows there is no significant difference between sitting and standing group individuals (Table-3).

Analysis done using independent "t" test for lumbar lordosis between both groups obtained (t value= .428, p value> 0.05). The result shows there is no significant difference between sitting and standing group individuals (Table-4).

Table-1 Baseline characteristics of study population

Variables	Sitting group (mean±standard deviation)	Standing group (mean±standard deviation)
Number of individuals	15	15
Age	39.2±10.153	43.6±5.759
BMI	23.2±1.423	23.5±1.359

Table-2 Comparison of NPRS between two groups using independent "t" test

Outcome measure	Group	Mean	Standard deviation	Independent "t" test value	"p" value
NPRS	Sitting	4.73	.59	2.15	.040
	Standing	5.33	.89		

Table-3 Comparison of disability between two groups using independent "t" test

Outcome measure	Group	Mean	Standard deviation	Independent "t" test value	"p" value
Disability	Sitting	26.13	5.73	.98	.33

Table 4: Comparison of lumbar lordosis between two groups using independent "t" test

Outcome measure	Group	Mean	Standard deviation	Independent "t" test value	"p" value
Lumbar lordosis	Sitting	32.48	3.06	.428	.672
	Standing	32.02	2.81		

DISCUSSION

The aim of the study is to find out prevalence of low back pain among prolonged sitting and standing posture.

30 Low back pain individuals are taken, 15 in each group (sitting and standing). They were selected in accordance with the inclusion criteria. Patient does not experience any discomfort during the assessment and observation.

The prevalence of low back pain in our study is identified by the presence of pain, disability and lumbar lordosis in individuals with low back pain. The study was mainly conducted to find out the prevalence of low back pain in sitting and standing group.

The result of this study shows a significant difference in pain among both the groups which was analyzed using independent "t" test.

In this study, there is no difference seen in disability and lumbar lordosis among the two groups. In acute low back pain, some individuals had mild disability and lumbar lordosis changes, the other some individuals have moderate disability and lumbar lordosis changes in the same group.

This study has shown the result of mild and moderate outcome measures score in pain rating which has certain factors to include, continuous static posture without adequate rest pause and attaining faulty posture.

Variations are seen in disability and lumbar lordosis in the same group, which is due to some ergonomical changes in work area and physical activity of an individual.

Thus, this study has proved, with one part of the outcome measure by showing standing for longer period of time induces low back pain.

CONCLUSION

This study was conducted to find out the prevalence of mechanical back pain, disability and lumbar lordosis in prolonged sitting and standing posture in working with the age group of 25-50years. The overall interpretation of the study states that back pain is prevalent in working professional who have standing occupation. It can be seen that long bouts of both the postures cause low back pain and proper ergonomics at an individual's work place is important for reduction and prevention of pain and disability.

Limitation of the study

- Due to covid 19 pandemic outbreak, limited samples were available during the study.
- Generalized age category not included in our study. This study includes only with the age group of 25-50years

Suggestion for future studies

- The study can be carried out by taking particular occupation in both groups and

also by suggesting them with the treatment.

- Further study can be carried between two measures (i.e. pain and disability or disability and lumbar lordosis) in one particular group.

Declaration by Authors

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Conflict of Interest: We declare that there was no conflict of interest in the entire journey of the study.

REFERENCES

1. Pillai D, Haral P. Prevalence of low back pain in sitting vs standing postures in working professionals in the age group of 30-60. International Journal of Health Sciences & Research. 2018 Oct;8(10):131-7.
2. Evcik D, Yücel A. Lumbar lordosis in acute and chronic low back pain patients. Rheumatology international. 2003 Jul; 23:163-5.
3. Will JS, Bury DC, Miller JA. Mechanical low back pain. American family physician. 2018 Oct 1;98(7):421-8.
4. Ganesan S, Acharya AS, Chauhan R, Acharya S. Prevalence and risk factors for low back pain in 1,355 young adults: a cross-sectional study. Asian spine journal. 2017 Aug;11(4):610.
5. Jana A, Paul A. Epidemiology of low back pain: A literature review. International Journal of Physical Education, Sports and Health2019. 2019;6(3):233-7.
6. Nourbakhsh MR, Arab AM. Relationship between mechanical factors and incidence of low back pain. Journal of Orthopaedic & Sports Physical Therapy. 2002 Sep;32(9):447-60.
7. Ahdhi G, Subramanian R, Saya G, Yamuna T. Prevalence of low back pain and its relation to quality of life and disability among women in rural area of Puducherry, India. Indian Journal of Pain. 2016 May 1;30(2):111-.
8. Misterska E, Jankowski R, Glowacki M. Quebec Back Pain Disability Scale, Low Back Outcome Score and revised Oswestry low back pain disability scale for patients with low back pain due to degenerative disc disease: evaluation of Polish versions. Spine. 2011 Dec 15;36(26): E1722-9.
9. Seidi F, Rajabi R, Ebrahimi TI, Tavanai AR, Moussavi SJ. The Iranian flexible ruler reliability and validity in lumbar lordosis measurements. World J Sport Sci. 2009;2(2):95-9.
10. Pathak A, Sharma S, Jensen MP. The utility and validity of pain intensity rating scales for use in developing countries. Pain reports. 2018 Sep;3(5).
11. Sorensen CJ, Norton BJ, Callaghan JP, Hwang CT, Van Dillen LR. Is lumbar lordosis related to low back pain development during prolonged standing? Manual therapy. 2015 Aug 1;20(4):553-7.
12. Tissot F, Messing K, Stock S. Studying the relationship between low back pain and working postures among those who stand and those who sit most of the working day. Ergonomics. 2009 Nov 1;52(11):1402-18.
13. Lis AM, Black KM, Korn H, Nordin M. Association between sitting and occupational LBP. European spine journal. 2007 Feb;16(2):283-98.

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